

# Genetics

## Chapter 11-1 & 11-2

### **Genetics is...**

the scientific study of heredity  
(traits that are passed from parent to offspring).
























## Gregor Mendel

“Father of Genetics”
























Austrian monk who studied the inheritance of traits in pea plants in the monastery garden.

Mendel studied 7 different pea plants true-breeding traits.  
 Looked at the following pea plant traits: seed shape, seed color, seed coat color, pod shape, pod color, flower position, and plant height

| P              |  X  |  X  |  X  |  X  |  X  |  X  |  X  |
|----------------|---|---|---|---|---|---|---|
| F <sub>1</sub> |    |    |    |    |    |    |    |

**Trait** – a specific characteristic, that varies from one individual to another.

| P              |  X  |  X  |  X  |  X  |  X  |  X  |  X  |
|----------------|---|---|---|---|---|--|---|
| F <sub>1</sub> |    |    |    |    |    |    |    |

Mendel determined that...

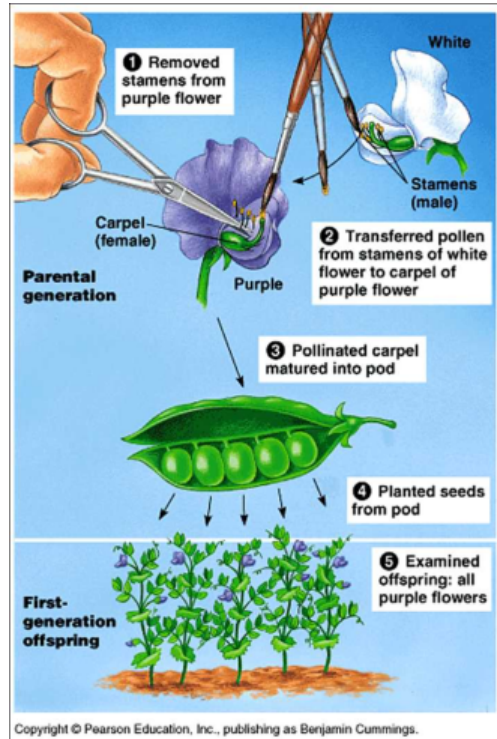
- Traits are determined by factors inherited from parents
- We now know that these “**factors**” are **genes**

**Allele** – the different or alternate form of a gene.

For example: Flower color in pea plants has 2 alleles: purple and white



# Mendel's Experiment



## Principle of Probability

Understanding of probability is used to predict patterns of genetic inheritance.



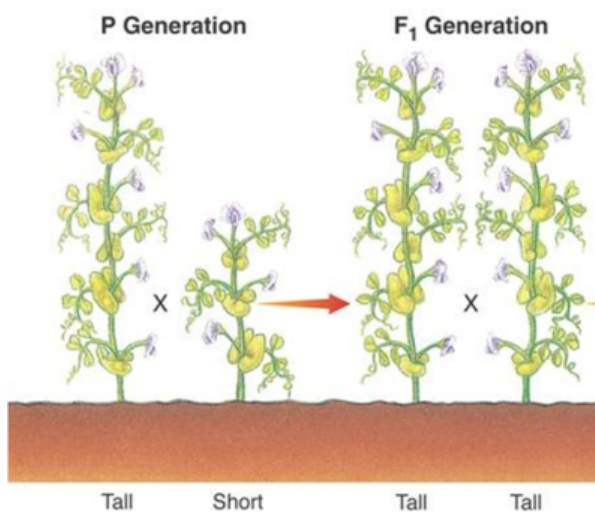
# **Principle of Dominance**

States that some alleles are dominant and others are recessive.

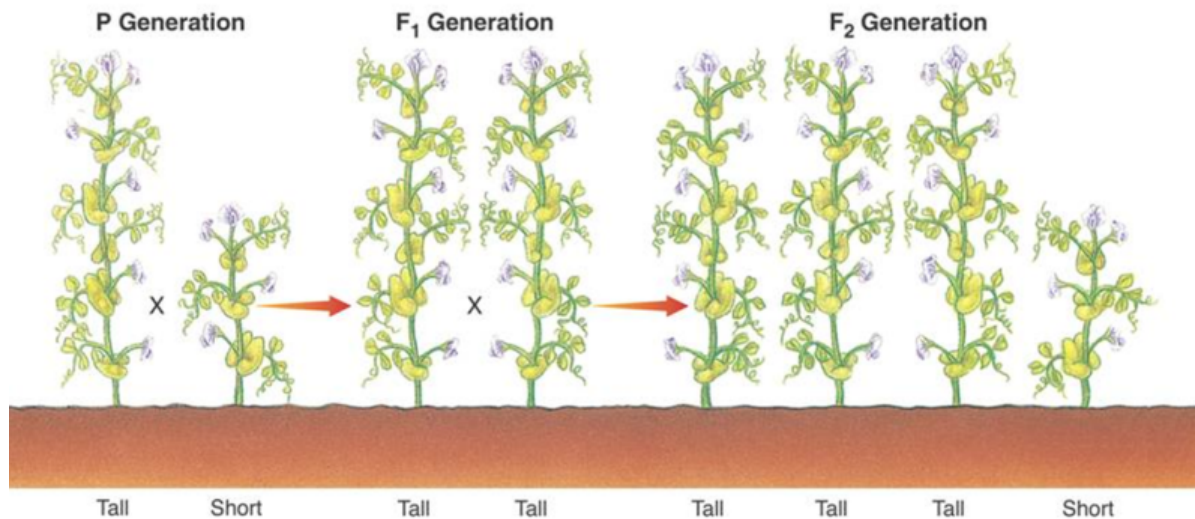
**Dominant** - a dominant allele is the trait that is always expressed

**Recessive** - a recessive allele is the trait that is not expressed unless the dominant allele for the trait is not present.

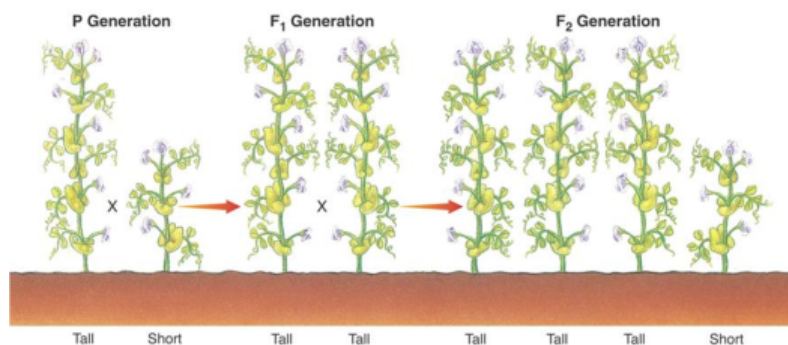
In Mendel's first generation of hybrid offspring the (F<sub>1</sub>) generation had the traits of only one parent (P). The other seemed to disappear.



When Mendel allowed the  $F_1$  plants to reproduce by self-pollination, the traits controlled by recessive alleles reappeared in about one fourth of the  $F_2$  plants in each cross.



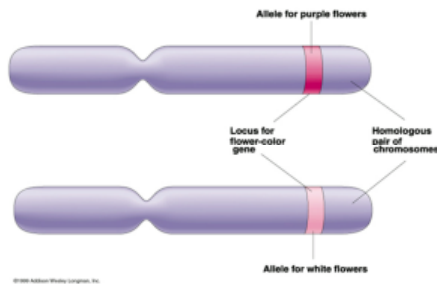
Mendel suggested that the alleles for tallness and shortness in the  $F_1$  plants segregated from each other during the formation of the sex cells, or **gametes**.





# **Law of Segregation**

During meiosis the two alleles separate from each other so that each gamete will carry only a single copy of each gene



## **Genotype vs. Phenotype**

- **Phenotype** is the physical characteristic of a trait of an organism, example: Tall or short
- **Genotype** is the genetic makeup of a trait example: Tt, TT, or tt.

# **Homozygous vs. Heterozygous**

**Homozygous** – two identical alleles for a particular trait, example : TT or tt

**Heterozygous** – two different alleles for the same trait, example Tt